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Letter to the Editor

Guideline-based intervention improves the quality of antibiotic allergy registration in a hospital setting

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To the Editor,

Worldwide, up to a quarter of patients admitted to a hospital have an allergy registration for one or more antibiotics [1]. Previous studies have shown that most of these labels are incorrect [2,3]. Incorrect allergy registrations and subsequent unnecessary use of second-line antibiotics have negative consequences for both the individual patients and society as a whole. In the Netherlands, a formal guideline was recently developed that provides recommendations for the approach towards suspected antibiotic allergy [4]. We assessed the outcome of a structured review of presumed-allergic reactions on antibiotic allergy registrations in patients admitted to the hospital.

This prospective cohort study was conducted from February 2022 to October 2022 at the Leiden University Medical Center, a university hospital as well as a tertiary care facility. The intervention was part of the 'antibiotic allergy registration project' aimed to improve the quality of antibiotic allergy registrations. Adult patients (aged >18 years) admitted to the Leiden University Medical Center in whom an antibiotic allergy was registered in the electronic health records were eligible for inclusion. Patients were assigned to a trained allergy executive from the antibiotic allergy registration project. The team of allergy executives consisted of medical doctors/pharmacists in training, nurses, and internal medicine residents. A structured allergy history was recorded, and the electronic health record was searched for additional information regarding the index reaction and re-exposition to the antimicrobial agent. The type of allergy was classified as immediate vs. delayed-type allergy. Classification of the severity of allergic reactions was based on both the symptoms and the consequences of the reaction [4]. On the indication, cases were reviewed by a multidisciplinary team. The recommendation for future use was determined following the recently developed Dutch guideline (Fig. 1) and communicated to all involved health care providers, including pharmacy and general practice. This study was approved by the research council of the Leiden University Medical Ethical Committee.

During the study period, 311 antibiotic allergy labels were evaluated. The most reported antibiotic allergy was to penicillins, accounting for 60% of registrations. Before the intervention, most registrations lacked information on the type, timing, and/or severity of the reaction (Table 1). After performing the intervention, 155 (50%) registrations were concluded to represent a potentially true-allergic reaction. In 250 (80%) registrations, re-exposition to the antibiotic was permitted either under medical supervision (16%) or without any restrictions (64%). Before the intervention, the entire antimicrobial class (i.e. β-lactams for amoxicillin allergy) was included in the label in 193 (62%) registrations. After the intervention, the antimicrobial class could be removed from 98 (51%) registrations.

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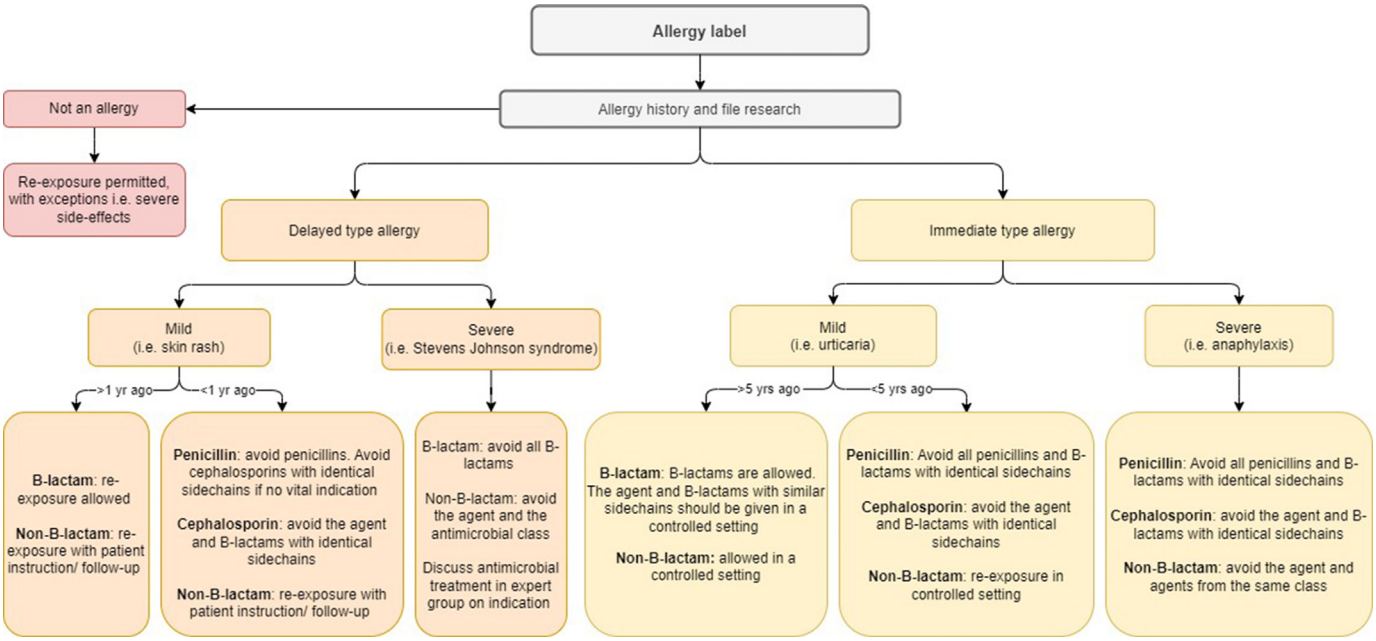

Fig. 1. Flowchart for the recommendation on future use of the antimicrobial agent.

Table 1
Characteristics of antibiotic allergy registrations before and after the intervention

Antibiotic allergy registrations	311	(%)
Antimicrobial agent		
Penicillin	188	(60)
Cephalosporin	12	(4)
Tetracycline	16	(5)
Fluoroquinolone	26	(8)
Lincomycin	14	(5)
Nitrofurantoin	20	(6)
Other[a]	35	(11)
Elements of registration before the intervention		
Approximate date	21	(6.8)
Symptoms	197	(63)
Time until start symptoms	13	(4)
Duration of the symptoms	3	(1)
Severity	173	(56)
Type of reaction	9	(3)
Recommendation future use	2	(1)
Conclusion on type of reaction after the intervention		
Immediate-type hypersensitivity reaction	59	(19.0)
Mild	22	(7.1)
Severe	33	(10.6)
Unknown	4	(1.3)
Delayed-type hypersensitivity reaction	96	(30.9)
Mild	94	(30.2)
Severe	2	(0.6)
Allergy label removed		
Adverse event (not immune-mediated)	64	(20.6)
Re-exposure without symptoms[b]	50	(16.1)
Reaction not related to the antibiotic[c]	20	(6.4)
No conclusion possible	22	(7.1)

Antibiotic allergy registration before the intervention and conclusion on the type of reaction after the intervention. Data are presented as no. (%).

[a] Others include trimethoprim/sulfamethoxazole, fosfomycin, metronidazole, and rifampicin.

[b] Patient was re-exposed to the culprit drug in the past without developing any signs or symptoms.

[c] Reaction was not caused by the antimicrobial agent. For example, symptoms were the result of the infection or resulted from other drugs.

To our knowledge, this study is the first to assess a guideline-based intervention to improve antibiotic allergy registrations. The data presented here clearly show that with this intervention, the quality of allergy registrations can be improved and that in most registrations, there is no contraindication for future use of the antibiotic for which an allergy label was registered. Because the awareness of incorrect allergy registrations is rising, multiple delabelling programmes have been published worldwide. These programmes are mostly limited to β-lactam antibiotics and often define their outcomes as negative skin and/or provocation testing. Our method is based on clear clinical criteria—supported by recent guidelines—substantially reducing the need for allergy testing. Therefore, the intervention used in this study is relatively easy to implement in clinical practice, even in settings where routine allergy testing is not readily available. Additional testing was recommended in 21% of the cases. For these patients, a guideline-based recommendation on re-exposure was provided pending further testing results. In well-defined cases—as described in the guideline—delabelling is safe and justified without further testing.

We did not assess the impact of the intervention on the subsequent prescription of optimal antimicrobial treatment, which is the ultimate goal. However, the intervention was targeted at hospitalized patients who are more likely to receive antibiotic therapy in the (near) future, either within or outside the hospital. Hence, sharing the (de)labelling results with the general practitioner and other health care providers outside the hospital setting has the potential to contribute to improved prescription practices.

Next to correcting existing allergy registrations, efforts should also be directed at preventing incorrect registrations in the future. The study intervention may improve the quality of new registrations because it contains an educational component because both the patients and attending physicians are actively involved in improving the registration. Furthermore, other health care professionals outside the hospital were informed about the improved label concerning the guidelines. However, the causes of incorrect allergy registrations are multifactorial, and the problem cannot be tackled by education alone. In addition to educational activities, advances in infomation and communication technology (ICT) applications and communication between health care facilities should be incorporated into the improvement strategy [5]. Because incomplete and incorrect allergy registrations are seen in all health care domains (i.e. general practitioner offices, pharmacies, and

elderly care facilities), there is a need for effective and feasible allergy delabelling programmes. These should transcend the hospital setting and prevent the redistribution of incorrect registrations between health care domains. Further research should test the applicability of this intervention in a diversity of health care facilities.

In conclusion, a relatively simple intervention proved to be an effective method for correct antibiotic allergy registration. This suggests that with the implementation of the new guideline, unnecessary use of second-line antibiotics and related risks for individual patients and the society may be prevented, which makes it a promising tool for antibiotic stewardship.

Author contributions

M.L. conceptualized the study and designed the methodology. C.W., T.M., L.K., L.D., and J.B. collected the data; C.W. and M.L. wrote the original draft; C.W., L.K., E.Z., M.B., L.V., and M.L. reviewed and edited the manuscript; and M.L., M.B., M.B., E.Z., and B.H. supervised the study. All authors have read and agreed to the published version of the article.

Transparency declaration

Conflicts of interest

The authors declare that they have no conflicts of interest.

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